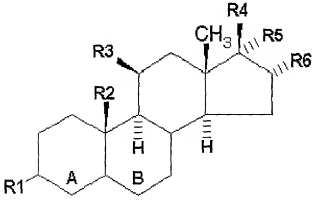
CLAIMS

What is claimed is:

1. A method of inducing production of isoflavones in a plant comprising:

a) applying a biologically effective amount of composition comprising a nuclear receptor ligand selected from the group consisting of:

a steroid having structure I or structure II as below,



Wherein rings A, B have the same or different degrees of saturation,

wherein

R1 = OH or O,

R2 = H or CH_3,

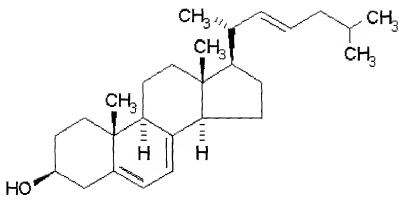
R3 = O, OH, or H,

R4 = O, OH, H, CO_2H, $C(O)CH_2OH$, or $C(O)CH_3$,

R5 = OH or H, and

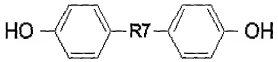
R6 = CH_3, OH or H;

II



2) a phenolic compound, wherein the phenolic compound is a phenolic estrogen or a diphenyl having structure III as below,

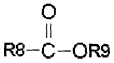
III



Wherein R7 = a direct connection (single bond) or a branched or unbranched alkene or alkane;

(3) a long chain fatty acid having structure IV below,

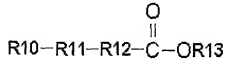
IV



Wherein R8 is a saturated or unsaturated aliphatic chain comprising from 5 to 25 carbon atoms and R9 is a hydrogen or an aliphatic chain with 1-5 carbons;

(4) a peroxisome proliferator having structure V below,

V



Wherein R10 is an aromatic ring or rings,

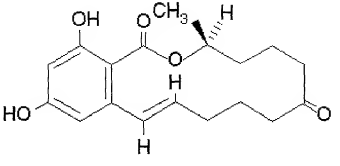
R11 is an O or S,

R12 is a branched or linear aliphatic chain comprising 1-8 carbons,

R13 is an aliphatic chain comprising from 1 to 5 carbon atoms; and

(5) the fungal steroid zearalenone, having structureVI below,

VI



2. The method of claim 1 wherein the nuclear receptor ligand is a steroid.

3. The method of claim 2 wherein the steroid is selected from the group consisting of 17-beta-estradiol, estrone, estriol, ergosterol, zearalenorie, aldosterone, androsterone, progesterone, pregnenolone, dexamethasone, cortisone, hydrocortisone, and combinations thereof.

4. The method of claim 1 wherein the nuclear receptor ligand is a phenolic compound.

5. The method of claim 4 wherein the phenolic compound is selected from the group consisting of genistein, daidzein, and coumesterol.

6. The method of claim 4 wherein the phenolic compound is an estrogen agonist.

7. The method of claim 6 wherein the estrogen agonist is diethylstilbestrol, dienestrol or hexestrol.

8. The method of claim 1 wherein the nuclear receptor ligand is a long chain fatty acid.

9. The method of claim 8 wherein the long chain fatty acid is selected from the group consisting of arachidonic acid, linoleic acid, docosahexanoic acid, eicosapentaenoic acid, pretroselenic acid, oleic acid and elaidic acid.

10. The method of claim 1 wherein the nuclear receptor ligand is a peroxisome proliferator.

11. The method of claim 10 wherein the peroxisome proliferator is selected from the group consisting of clofibric acid, ciprofibrate, and 2-(o-chlorophenoxy)-2-methylpropionic acid (CPMPA).

12. The method of claim 1 wherein the composition further `comprises a compound which enhances the activity of the nuclear receptor ligand.

13. The method of claim 12 wherein the enhancing compound is orthovanadate, rose bengal, or a tetrazolium redox dye.

14. The method of claim 12 wherein the enhancing compound is a copper salt or a fragment of the naturally occuring cell wall glucan from the pathogen *Phytophthora sojae.*

15. The method of claim 1 wherein the composition further comprises one or more compounds selected from the group consisting of a phytologically acceptable diluent or adjuvant.

16. The method of claim 1 wherein the composition further comprises one or more active chemicals selected from the group consisting of a herbicide, an insecticide, a fungicide, and a bacteriocide.

17. The method of claim 1 wherein the composition is applied to the plant stem, the plant root, the plant leaf, or combinations thereof.

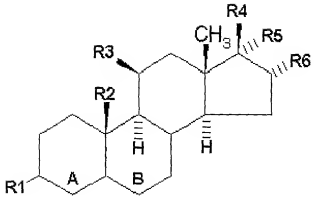
18. The method of claim 1 wherein the composition is applied to a seed or a seedling.

19. The method of claim 1 wherein the composition is applied to a legume selected from the group consisting of alfalfa, lima bean, pinto bean, chickpea, peanuts, and soybean.

20. The method of claim 19 wherein the legume is soybean.

21. A composition for enhancing levels of isoflavones in a plant or seed, comprising: one or more nuclear receptor ligands and one or more compounds which enhance the activity of the nuclear receptor ligand; wherein said nuclear receptor ligands are selected from the group consisting of

(1) a steroid having structure I or structure II as below,



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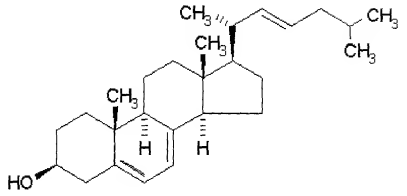

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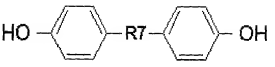

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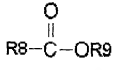

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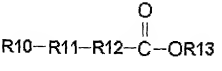

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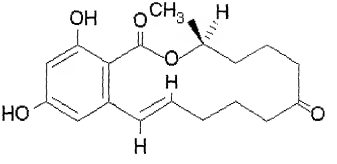

22. The method of claim 21 wherein the enhancing compound is orthovanadate, rose bengal, or a tetrazolium redox dye.

23. The method of claim 21 wherein the enhancing compound is a copper salt or a fragment of the naturally occuring cell wall glucan from the pathogen *Phytophthora sojae.*